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1986 Annual Operational Monitoring Report For the Regional Landfill Site in Binbrook

CA3 ON HW Q 90
M56
1986 -

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1986 ANNUAL OPERATIONAL MONITORING REPORT FOR THE REGIONAL LANDFILL SITE IN GLANBROOK

Prepared for:

THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH

TROW HYDROLOGY CONSULTANTS LTD.

Project: W87-1224-A
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1986 ANNUAL OPERATIONAL MONITORING REPORT FOR THE REGIONAL LANDFILL SITE IN GLANBROOK

1.0 INTRODUCTION

Trow Hydrology Consultants Limited (THCL) was authorized by the Regional Municipality of Hamilton-Wentworth to prepare the annual report based on the results from the 1986 monitoring program which the Region conducted at its landfill site in Glanbrook. These results, along with historical chemical data were supplied by the Municipality.

In order to understand the hydrogeologic setting, previous documentation pertaining to the landfill was reviewed. This documentation consisted of portions of hydrogeological reports prepared by Gartner Lee Associates Limited.

2.0 MONITORING RESULTS

The results of recent chemical analyses of the groundwater sampled during the 1986 monitoring program were reviewed, and where possible, compared with earlier reported analyses. In order to effectively assess the 1986 chemical results in the context of the total data base, the monitoring stations were grouped into background monitoring stations screened in the overburden and screened in the bedrock, and downgradient monitoring stations screened in the overburden and bedrock. Individual monitors are discussed where warranted. Analytical results are presented in Appendix A. Monitoring well locations are shown in Figure 1. Surface water and leachate chemistry as well local groundwater levels are also documented and discussed herein.

The measured concentrations of chloride in groundwater are used in this report as a reliable indicator of groundwater contamination at landfill sites, as leachates characteristically contain high concentrations of chloride. In addition, chloride behaves as a non-reactive solute in solution and essentially migrates from the landfill site in both a similar direction and rate as the average linear groundwater velocity. The Ministry of the Environment drinking water objective for chloride in groundwater is 250 mg/L.

2.1 Background Monitoring Stations

According to information contained in previous studies, the shallow groundwater (in the overburden) moves radially away from the centre of cells 1 to 4, towards Buckhorn Creek and the Welland River. From observations made during a site visit in April 1987, cells 1 to 4 have apparently been used in the past for waste disposal, and therefore any shallow monitoring wells on the perimeter of these cells cannot be classified as background monitors. Wells which can be used for the determination of background water quality in the shallow (overburden) flow system are located at boreholes 1, 5 and 17.

In the original hydrogeologic study, groundwater flow in the bedrock beneath the fill area was determined to be in an easterly direction towards the Welland River. Those monitors installed in the bedrock at boreholes 13, 14 and 24 are therefore downgradient of the fill area. For conservatism monitors at boreholes 13 and 24 are assumed to be affected by landfilling in the southern portion of cell 1 (Figure 1). Results from bedrock monitors at boreholes 1 and 12 may be used as background quality indicators. The deep monitor at borehole 5 is not downgradient of the fill area, as bedrock groundwater flow at this location is in a westerly direction toward the river. Consequently, this monitor may be used to measure background water quality.

Background water quality in both the overburden and bedrock flow systems has been characterized as follows (from the 1985 Operations Monitoring Report, Gartner Lee and Associates Ltd.):

> "... naturally quite mineralized and of poor quality. It is generally very hard with high concentrations of chloride and sulphate. The major anions tested, sodium, potassium, calcium and magnesium, are present in moderate concentrations. Heavy metals are generally not detected or are below the detection limit except for iron, manganese and possibly lead. There is a tendency towards higher concentrations of chemical parameters in the groundwater in the bedrock compared to the soil."

2.1.1 Monitors Screened in Overburden 1A-II, 1A-III, 5-II, 5-III, 17-I, 17-II, 17-III,

The chemical constituents have flucuated in the background monitoring stations screened in the overburden. Historical data shows there is a general decrease in the chemical concentrations in all these wells except 5-II and 5-III. Although monitoring at 5-II has shown an increase in chlorides from 30 mg/L in 1984 to 211 mg/L in 1986 and a similar increase in other constituents, other 1986 chemical results represent typical background quality. The variability noted in monitor 5-II is discussed in Section 3.0. Monitor 5-III indicates only a minor increase in chloride concentration since the initiation of monitoring in 1980 with a 1986 reading of 27 mg/L, however, phenolics have reached the highest concentration to date, (0.026 mg/L). Moreover, constituents such as hardness, conductivity, COD and nitrogen also show an increase in monitor 5-III. Monitor 1A-II shows an increase in phenols to 0.024 mg/L in 1986, also the highest concentration of this constituent reported to date. The remainder of parameters measured in 1A-II exhibit levels similar to 1985 results, as do the parameters analysed in 1A-III.

All three monitors at borehole 17 exhibit results similar to those historically reported.

2.1.2 Monitors Screened in Bedrock 1A-I, 5-I, 12-I

The results from monitoring stations 1A-I, 5-I and 12-I exhibit chemical concentrations below background, with some variation in levels of specific parameters. Chloride concentrations measured in wells 1A-I, 5-I and 12-I are 10 mg/L, 172 mg/L and 18 mg/L respectively.

2.2 Downgradient Monitoring Stations

2.2.1 Downgradient Overburden Monitoring Stations 12-II, 13-II, 13-III, 13-IV, 14-II, 14-III, 24-II, 24-III, 25-I, 25-II, 25-III, 26-I, 26-II

Data for monitors 13-II, 24-II, 24-III and 25-III show a decrease in most chemical constituents since the initiation of monitoring. The organic nitrogen concentration in monitors 24-II (10.4 mg/L) and 24-III (18.4 mg/L) are higher than

background. The chloride concentrations in 13-II, 24-II, 24-III and 25-III are 116 mg/L, 32 mg/L, 9 mg/L and 7 mg/L respectively.

Monitors 12-II, 13-III, 13-IV, 14-II, 14-III, 25-I, 25-II, 26-I and 26-II show little variation in most chemical concentrations (or at most, a slight increase over background for certain parameters). An elevated phenolics level is reported from 13-III (0.018 mg/L). Chloride concentrations in monitor stations 12-II, 13-III, 13-IV, 14-II, 25-I, 25-II, 26-I, and 26-II are 16 mg/L, 148 mg/L (May 1986), 28 mg/L, 144 mg/L, 15 mg/L, 162 mg/L and 196 mg/L respectively.

2.2.2 Downgradient Bedrock Monitoring Stations 13-I, 14-I, 24-I

Monitoring stations 13-I, 14-I and 24-I have constituent levels which do not vary from background. The chloride concentrations in 13-I, 14-I and 24-I are 183 mg/L, 206 mg/L and 212 mg/L respectively.

2.3 Surface Water Chemistry

Chlorides, pH and conductivity are the only data available for the surface water samples prior to 1986. The pH shows insignificant variation since surface water monitoring was initiated in 1982. Conductivity and chloride concentrations have both decreased since 1982. The 1986 chloride concentrations are 31.0 mg/L (SW1), 39 mg/L (SW2) and 69 mg/L (SW3). These results are presented in Appendix B.

2.4 Leachate Quality

The leachate quality has fluctuated over the monitoring period. Chemical data for 1986 are available for manhole 1 and manhole 4 only, and are presented in Appendix C. These results are typical of landfill leachate, with the exception of 0.5 mg/L chloride as reported from manhole 4.

2.5 Water Levels

The 1986 groundwater level measurements in Appendix D confirm the flow patterns described in the original hydrogeological study. Water level patterns

measured by the deep monitors are consistent with previous measurements and show an easterly groundwater movement towards the Welland River. The radial shallow groundwater flow pattern, easterly toward the Welland River, and westerly and southerly towards Buckhorn Creek, is reflected in the 1986 shallow monitor water levels.

The shallow monitors generally have a higher water level than the deeper monitors, indicating a small downward hydraulic gradient. The exception to this occurs at borehole 12 where the water level measurements reflect a slight upward hydraulic gradient.

The leachate levels show no significant variation from-those reported previously.

3.0 DISCUSSION

The chemical concentrations measured at some monitoring stations show considerable variation throughout the monitoring record. For example, monitor 5-I exhibited anomalously low contaminant levels in 1983 and 1984, however in 1985 and 1986 results indicated higher concentrations typical of the "background" levels exhibited in 1980. A similar trend (i.e., low values in 1984 and more typical background values in 1985 and 1986) is evidenced in 5-II. Several individual results are also questionable, particularly the high phenol values in 1A-II, 5-III (background monitors) and 13-III, and the most recent chloride results from manhole 4 (0.5 mg/L). Elevated chromium levels are reported from many monitoring stations both in background and down gradient monitors and in surface water. These data appear to be spurious. In the 1985 Operational Monitoring report, a review of sampling protocols was recommended to resolve the variability then observed in sample results. Trow Hydrology Consultants Ltd. has no knowledge of such a review being undertaken.

[redacted]

4.0 CONCLUSIONS AND RECOMMENDATIONS

The groundwater flow patterns are similar to those originally established in the hydrogeological study of the site.

The leachate chemical data shows considerable variation between locations. The 1986 leachate chemical concentrations are typical of landfill leachate except for the low chloride concentration measured at manhole 4 (0.5 mg/L) which is probably in error.

The 1986 monitoring program results show no serious degradation of groundwater quality. Elevated concentrations of several parameters in monitor 5-III indicate that this well may currently be affected by land uses not associated with the landfill.

The surface water chloride concentrations indicate an improvement in water quality since the initiation of monitoring. However, the impact of the landfill on the surface water cannot be thoroughly assessed because 1986 was the first period in which additional chemical constituents were measured.

Groundwater and surface water monitoring results indicate that operation of this landfill site, in 1986, was proceeding in an environmentally acceptable manner.

Given the significant variation in chemical results, sampling techniques and laboratory protocol should be thoroughly reviewed in order to assess their possible influence on analytical results.

Respectfully Submitted,

TROW HYDROLOGY CONSULTANTS LTD.

J. Beechinor, P.G.A.C.
Senior Hydrogeologist

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Trow

Figure 1

Monitoring Well Locations

APPENDIX A

MONITORING STATIONS CHEMICAL ANALYSES

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 1A-1

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	3100	7.80	198	1680		1550	0.55		<.05	0.097	0.70		1	132	6.70	370	195		ND	ND	ND	0.09	0.10	<.1	ND	0.10	
28-Aug-80	2900	7.80	205	1600		1530	0.69		<.05	0.025	0.70		1	156	6.80	399	200		<.01	<.02	<.05	0.30	<.1	<.1	0.05	<.01	
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	2900	7.50	205																								
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82	3050	7.20	176	1800		1500	0.56		0.08	ND		22									0.09	0.02	0.09			0.05	0.10
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	2000	6.70	141	1760			1350					<1	<5								<.1	<.05	<.05			.02	0
.05																											
10-Apr-84																											
17-Jul-84																											
15-Oct-84	2750	6.65	194	2100	230	1500	1.20	0.78	0.40	ND		18	1.4		56	2.80	395					<.05	<.1				
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	80	6.80	8	62	46	10	1.28	0.45	0.76	0.010		44	<1		4	1.11	14	4				0.10					
06-May-86																											
05-Aug-86																											
21-Oct-86	122	6.80	10	140	1500	8	0.92	0.64	1.20		12	18	1.5	4.0	2	2.00	11	40	0.55	<.02	0.03	<.05	0.25	<.05	<.05	<.05	<.02

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 1A-II

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	2900	7.9	260	1530		1270	0.94		<.05	0.013	0.70		1	129	3.80	287	203		ND	ND	ND	0.07	0.10	0.10	ND	ND
28-Aug-80	2900	7.9	262	1690		1260	0.59		<.05	0.027	4.70		1	142	3.80	301	206		<.01	<.02	<.05	1.34	0.10	<.1	<.05	0.01
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	2750	7.50	235																								
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82	2600	7.50	200	1445		1150	0.32		0.67	ND		60									0.08	0.02	0.79			0.02	<.01
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	1800	7.00	148	1440		1000	0.44		0.10	0.010	<1	<5									<.1	<.05	0.11			<.02	0.02
10-Apr-84																											
17-Jul-84																											
15-Oct-84	1900	6.65	226	1700	230	1091	1.90	0.88	ND			75	1.3		132	10	233					<.05		<.1			
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	150	7.45	9	170	149	68	0.96	0.48	0.74	0.010		29	4.6		4	2	53	15				0.05					
06-May-86																											
05-Aug-86																											
21-Oct-86	159	7.80	11	200	150	19	0.92	0.64	0.90	24.480	37	22	4.0	4.5	3	1	31	32	0.14	<.02	0.07	<.05	0.40	<.05	<.05	<.05	<.02

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 1A-III

DATE	CONDUCT	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL	AMMONIA	NITRATE	PHENOL	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS	CADMIUM	CHROMIIIIIIIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZIN C
	uMHOS/CM						AS N			ug/L									AS P								
30-Jul-80	2600	7.6	110	1170		920	0.72		<.05	0.027	2.60		3	153	4.20	231	168		ND	ND	ND	0.23	0.10	0.80	ND	ND	
28-Aug-80	2500	7.6	112	1270		1040	4.00		0.32				1	162	4.30	252	175		<.01	<.02	<.05	3.12	0.10	0.75	<.05	<.01	
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	2400	7.50	99																								
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82	DRY																										
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	1700	6.80	100	1350		900	0.24		<.01	0.018	6	15								<.1	<.05	0.22			<.02	0.01	
10-Apr-84																											
17-Jul-84																											
15-Oct-84	DRY																										
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	340	7.30	38	506	344	198	3.41	2.76	0.20	0.010		73	5.8		29	2.67	110	60				1.20		0.52			
06-May-86																											
05-Aug-86																											
21-Oct-86	350	7.30	30	400	300	116	6.00	1.94	0.30		15	56	4.5	8.5	13	3	82	60	0.43	<.02	0.19	<.05	8.30	0.05	1.10	<.05	0.06

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 5 I

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	2600	7.5	210	1200		1160	0.36		<.05	0.035	0.50		2	112	2.50	288	151		ND	ND	ND	0.12	0.10	1.10	ND	ND	
28-Aug-80	2680	7.7	216	1350		1210	0.40			0.028	0.90		2	130	3.50	305	150		<.01	<.02	<.05	0.56	<.1	1.45	<.05	0.03	
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
*********																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	2450	7.50	182																								
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82	245	7.70	8	105		13	0.56		1.10	ND		30									0.04	<.01	0.02			<.01	<.01
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	170	5.70	5	100		27	0.12		0.80	0.011		21									<.1	<.05	0.11			<.02	<.01
10-Apr-84																											
17-Jul-84																											
15-Oct-84	220	6.40	16	270	105	13	0.90	0.70	0.05			29	1.8	1		90	11					1.20		<.1			
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1200	6.60	177	1588	144	1432	0.74	0.34	0.60	0.010		15	<1	134	6.50	351	190							0.06			
06-May-86																											
05-Aug-86																											
21-Oct-86	1480	7.20	172	2210	150	2182	32.00	0.64	0.10			5	76	3.5	5.0	121	7.00	110	188	0.01	<.02	0.67	<.05	0.20	<.05	0.05	<.05	0.03

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 5- II

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80																											
28-Aug-80																											
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81																											
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82																											
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83																											
10-Apr-84																											
17-Jul-84																											
15-Oct-84	390	6.60	30	400	220	30	1.20	0.62	0.25	10.200		25	3.2		2	0.20	130	18					<.05		<.1		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1150	6.30	210	1244	135	1159	0.74	0.64	0.45	0.010		29	<1		126	3.20	254	190					0.70		0.11		
06-May-86																											
05-Aug-86																											
21-Oct-86	1340	7.30	211	1560	140	1569	1.52	0.90	0.10		67	28	1.5	1.5	116	4.00	330	170	0.03	<.02	0.52	<.05	3.90	<.05	0.10	<.05	<.02

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 5- III

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	600	7.9	11	320		160	0.98		0.23	0.067	1.30		4	7	1.30	63	27			ND	ND	ND	0.65	0.10	0.30	ND	ND
28-Aug-80	650	8.2	14	350		150	1.00		<.05	0.027	2.20		2	14	1.60	82	46			<.01	<.02	<.05	1.62	<.1	0.30	<.05	<.01
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	650	7.50	15																								
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82	950	7.50	30	545		225	6.08		0.06	ND		88									0.04	0.01	3.90			0.04	0.01
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	300	7.10	12	240		30			2.50	0.041	72	15									<.1	<.05	0.19			<.02	<.01
10-Apr-84																											
17-Jul-84																											
15-Oct-84	460	6.50	29	410	340	78	1.20	0.92	0.20	0.007		47	3.0		10		125	24					<.05	<.1			
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	DRY																										
06-May-86																											
05-Aug-86																											
21-Oct-86	1300	7.10	27	1310	660	818	14.40	0.90	2.40	25.500	67	194	4.0	10.5	99	8.00	242	150	3.45	<.02	0.45	<.05	1.50	0.05	0.35	<.05	0.19

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 12- I

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	3200	7.10	240	1720		1490	0.38		<.05	0.007	7.70		2	139	6.80	410	160						0.07				
28-Aug-80	3150	7.50	243	1740		1660	0.42		<.05	0.021	7.30		<.5	156	6.70	424	166						0.12				
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	2900	8.00	227																								
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82	1250	7.40	6	833		530	0.56		ND	ND		22									0.01	0.09	0.37		0.01	0.01	
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	1200	7.20	24	790		500	0.12		0.20		38	<5									<.1	<.05	<.05		<.02	<.01	
10-Apr-84																											
17-Jul-84																											
15-Oct-84	1350	6.60	36	1010	320	511	1.10	0.64	0.25		34	1.9		43	0.20	223	110						<.05	0.19			
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1100	7.35	128	264	210	955	7.15	0.66	0.10	0.010		ND	1.0		102	4.60	287	130						0.22			
06-May-86																											
05-Aug-86																											
21-Oct-86	810	7.40	18	890	310	641	0.80	0.60	0.50		7	1	2.0	2.0	24	3.00	119	102	0.01	<.02	0.25	<.05	0.20	<.05	0.05	<.05	0.03

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 12- II

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	2900	7.30	60	1820		1560	0.46		<.05	0.011	0.90		4	77	4.20	274	278						0.10				
28-Aug-80	2650	7.80	67	1590		1450	0.33		<.05	0.026	0.50		1	88	4.20	280	249						0.24				
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	1750	7.50	38																								
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82	1250	7.50	5	810		50	0.32		0.12	ND		22									0.03	0.05	0.14		<.01	0.01	
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	900	6.80	11	570		270			0.30	0.071	2.00	<5									<.1	<.05	<.05		<.02	<.01	
10-Apr-84																											
17-Jul-84																											
15-Oct-84	1500	6.70	54	2168	208	648	1.70	0.70	0.20	0.071		25	1.8	24	2.70	669	120						<.05		0.16		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	900	7.55	49	935	244	784	0.73	0.48	0.08	0.010		29	1.5		2.89	194	150						0.10		0.22		
06-May-86																											
05-Aug-86																											
21-Oct-86	690	7.40	16	610	320	355	1.20	0.64	0.10		15	31	1.5	4	19	2.00	98	92	0.01	<.02	0.18	<.05	0.15	<.05	0.15	<.05	<.02

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 12- III

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80		8.3			4100									294	10.90	133	995						0.57				
28-Aug-80																											
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	5900	7.5		121																							
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82	DRY																										
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	NO SAMPLE																										
10-Apr-84	DRY																										
17-Jul-84																											
15-Oct-84																											
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	DRY																										
06-May-86																											
05-Aug-86																											
21-Oct-86	NO SAMPLE																										

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 13- I

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	1500	8.0				560							6.0	145	9.60	49	79			ND	ND	ND	<.1	0.20	1.30	ND	ND
28-Aug-80	1600	7.1	130	450		540							3.0	166	11.00	63	81										
27-Oct-80		8.0	180																								
28-Nov-80	2500	7.7	182																								
23-Dec-80	2500	7.8	122																								
05-Feb-81	2500	7.9	193																								
02-Mar-81	1800	8.6	240																								
25-Mar-81	2800	8.3	227																								
29-Apr-81	3000	8.3	205																								
22-May-81	2750	8.2	167																								
25-Jun-81																											
29-Jul-81																											
07-Aug-81	2600	8.3	235																								
29-Sep-81	2750	7.9	212																								
15-Oct-81	2900	7.5	225	700		1225	3.40		0.02	0.040	0.30			185	2.90	110	190	0.30	ND	ND		ND	0.50	ND	0.10	ND	ND
25-Mar-82	2400	7.3	227																								
26-May-82	2700	6.7	195																								
22-Jun-82																											
30-Jul-82	2900	7.1	173																								
25-Aug-82	2750	6.7	118																								
19-Oct-82	1700	7.2	102	229		835	1.52		0.13			22									0.12	0.06	0.23			0.01	0.04
28-Jan-83	2700	7.0	175	1657		1525	1.02		1.12	0.080		51									0.13	0.03	0.42			<.05	0.06
26-Apr-83	2800	6.7	196	1500		1450	2.00		0.20	0.088	1.20	13									<.1	0.03	0.57			<.05	<.01
28-Jul-83	NO SAMPLE																										
31-Oct-83	2600	7.1	153	1550		1450	2.32		0.30		32	<5									<10	<.05	<.05			<.02	0.03
10-Apr-84	2100	7.0	196	1640		1560	3.52		1.20	0.003	6	15										0.05	0.50				0.10
17-Jul-84																											
15-Oct-84	2700	6.7	208	1680	50	716	2.60	2.10	ND	ND		16	0.5		190	16.80	310	220					<.05		<.1		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1600	7.0	183	1418	62	1500	2.83	1.56	0.21	ND		15	1.3		185	22.80	261	190					0.10		0.02		
06-May-86																											
05-Aug-86																											
21-Oct-86	1490	7.0	183	1650	70	2046	16.80	1.40	1.20		7	19	1.5	1.5	172	24.00	255	193	0.01	<.02	0.46	<.05	0.25	<.05	0.05	<.05	0.05

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 13- II

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	3050	7.7	260	1570		1670	0.46		<.05	0.005	0.70		1	159	4.60	406	159		ND	ND	ND	<.1	<.1	0.10	ND	ND
28-Aug-80	2600	7.5	218	1360		1290	0.34		<.05	0.002	0.50		1	154	2.90	293	154		<.01	<.01	<.05	<.05	<.1	0.10	<.05	<.01
27-Oct-80	2200	7.70	165																								
28-Nov-80	2500	7.70	182																								
23-Dec-80	2400	7.70	182																								
05-Feb-81	2100	7.80	171																								
02-Mar-81	1800	7.90	200																								
25-Mar-81	1900	8.10	144																								
29-Apr-81	1900	7.90	144																								
22-May-81	2000	7.90	114																								
25-Jun-81	1700	7.80	180																								
29-Jul-81	1600	7.70	152																								
07-Aug-81	1650	7.60	174																								
29-Sep-81	1750	7.60	129																								
15-Oct-81	2100	7.40	215	680		1200	0.60			0.047				160	3.50	320	130	0.06	ND	ND	ND	1.00	ND	0.10	ND	ND
25-Mar-82	1700	8.00	159																								
26-May-82	1700	6.70	121																								
22-Jun-82	1500	7.10	106																								
30-Jul-82	1720	7.00	97																								
25-Aug-82	1700	6.90	115																								
19-Oct-82	1250	7.60	78	579		350	1.60		0.13			60									0.06	0.08	0.36		<.01	0.07
28-Jan-83	1600	7.20	120	811		850	0.38		0.08			44									<.1	0.01	0.75		<.05	0.05
26-Apr-83	1600	7.50	110	744		725	0.88		0.02	0.014	2.40	4									<.1	0.01	1.51		<.05	<.01
28-Jul-83	1980	7.30	152	810		925	<.01		0.02	0.078	5.00	52									0.03		2.35			0.03
31-Oct-83	1900	7.40	137	1120		920	0.56		0.10	0.255	8.00	< 5									<.1	<.05	<.05		<.02	<.01
10-Apr-84	1600	7.10	116	860		781	3.20		ND	0.006	3.00	7									ND	<.05	0.90		ND	
17-Jul-84																											
15-Oct-84	1600	6.90	124	1000	90	921	0.90	0.82	ND	0.033		41	1.4		126	ND		202	120				<.05		<.1		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1250	7.55	148	1120	234	921	1.21	0.33	0.07	0.010		235	1.5		143	2.80	217	160					9.00		0.59		
06-May-86																											
05-Aug-86																											
21-Oct-86	940	7.60	116	900	260	682	1.52	1.62	0.30		*****	24	2.0	3.5	82	1.00	96	142	0.26	<.02	0.19	<.05	0.80	<.05	0.45	<.05	<.02

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 13- III

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80																											
28-Aug-80																											
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81																											
25-Mar-82																											
21-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82																											
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83																											
10-Apr-84	1300	7.20	73	680		531	0.56		ND		5.00	ND								ND	<.05	0.70			0.02	ND	
17-Jul-84	1400	6.80	84	640	170	550	0.38		1.23	0.004	7.0	3.2	115	ND		85	95										
15-Oct-84	1400	6.80	92	2690	194	580	1.10	0.78	0.05	0.004	31.0	1.2	114	ND		878	120					<.05	<.1				
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	900	7.70	74	650	206	511	0.87	0.38	0.70	0.020		2.0	112	0.48		101	130					0.10	0.71				
06-May-86	1000	7.40	148	724	232	665	1.28	0.86	0.39	18.360	14.7	4.0	116	0.75		116	126					0.83	0.87				
05-Aug-86																											
21-Oct-86																											

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 13- IV

DATE	CONDUCT	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL	AMMONIA	NITRATE	PHENOL	BOD	COD	DOC	TOC	SODIUM	POTTTTTTTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZIN C
	uMHOS/CM						AS N			ug/l									AS P								
30-Jul-80	1700	8.2	34	806		700		<.05					2	144	2.70	237	150		ND	ND	ND	0.10	0.20	0.10	ND	ND	
28-Aug-80	2100	7.9	87	1020		740							1	59	2.90	152	340		< .01	< .02	< .05	<.05	<.1	1.00	<.005	<.01	
27-Oct-80	1900	7.0	45																								
28-Nov-80	2000	7.5	61																								
23-Dec-80	2000	7.2	45																								
05-Feb-81	1900	7.3	47																								
02-Mar-81	900	7.3	60																								
25-Mar-81	1800	7.6	38																								
29-Apr-81	1550	7.5	40																								
22-May-81	1700	7.3	38																								
25-Jun-81	2100	7.6	40																								
29-Jul-81	1500	7.6	38																								
07-Aug-81	1600	7.4	38																								
29-Sep-81	1700	7.6	38																								
15-Oct-81	1850	7.2	50	575		800	0.50		0.02	0.134			75		3.30	165	175		3.12	ND	ND	ND	2.40	ND	1.20	ND	0.03
25-Mar-82																											
26-May-82	1600	6.6	3																								
22-Jun-82	1550	7.1	7																								
30-Jul-82	1700	6.9	28																								
25-Aug-82	1600	6.9	33																								
19-Oct-82	1450	7.7	26	985		555	2.08		0.07			73.0								0.08	0.02	2.20			0.01	0.02	
28-Jan-83	1600	7.1	30	1081		650	1.82		<.01			44.0								< .1	0.80	2.95			<.05	0.04	
26-Apr-83	1700	7.3		1050		810	2.20		0.01	0.123	4.9	15.0								< .1	0.02	1.92			<.05	0.06	
28-Jul-83	1720	7.2	29	1160		610	0.74		<.01	0.114	3.0	< 1								0.05	0.05	2.67			0.02	0.01	
31-Oct-83	1500	7.0	26	1050		630	0.92		0.10	0.306	43.0	22.0								< .1	<.05	0.10			<.02	<.02	
10-Apr-84	1000	6.9	29	1080		531	0.80		ND		3.0	ND								ND	<.05	2.30			ND	ND	
17-Jul-84																											
15-Oct-84	1500	7.0	34	2730	418	580	1.90	0.60	0.30	0.006		29.0	1.4		54	0.20	828	160				0.07		< .1			
25-Feb-85	1200	7.4	29	1120	450	650	1.20	0.80	0.20	ND		20.0	19.0		55	2.50	143	170				2.00		0.10			
10-Apr-85	1380	7.1	29	1170	440	682	1.04	0.44	0.22	ND		7.0	15.0		60	2.90	166	171				2.46		1.30			
17-Jul-85	1000	7.7	28	1001	360		0.02	NSS	0.07	0.030												2.80		0.93			
29-Oct-85	900	7.9	40	826	362	NSS	1.58	0.72	0.67	0.010		15.0	1.7		54	3.50	114	170				0.60		0.05			
06-May-86																											
05-Aug-86	100	6.9	29	1017	363	614	0.04	0.28	0.30	ND		88.3	5.7		48	3.20	145	101				0.94		0.63			
21-Oct-86	960	7.3	28	1050	440	750	14.40	0.64	0.30		25.0	37.0	2.0	3.5	42	3.00	126	148	0.16	<.02	0.28	0.05	2.70	<.05	1.10	<.05	0.05	

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 14- II

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	2800	7.50	160	1500		1570	0.66		0.19				3	327	4.80	117	213		ND	ND	ND	0.10	0.10	0.30	ND	ND
28-Aug-80	2830	7.40	184	1550		1440	0.14		<.05				3	148	4.60	283	205									
27-Oct-80	3000	7.50	180																								
28-Nov-80	2600	7.30	212																								
23-Dec-80	3500	7.40	212																								
05-Feb-81	3000	7.40	176																								
02-Mar-81	2200	7.70	240																								
25-Mar-81	2200	7.40	174																								
29-Apr-81	2600	7.70	182																								
22-May-81	2800	7.70	152																								
25-Jun-81																											
29-Jul-81	2750	7.80	205																								
07-Aug-81	2200	7.50	190																								
29-Sep-81	2500	7.60	174																								
15-Oct-81	2500	7.20	170	675		1350	1.20		0.11	0.086	0.20			155	3.10	300	140	0.30	ND	ND	ND	0.30	ND	0.30	ND	0.03
25-Mar-82	2100	6.80	167																								
26-May-82	2600	6.90	147																								
22-Jun-82																											
30-Jul-82																											
25-Aug-82	2450	6.80	139																								
19-Oct-82	DRY																										
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	NO SAMPLE																										
10-Apr-84																											
17-Jul-84																											
15-Oct-84	2200	6.75	176	1636	144	1262	1.40	0.82		ND		24	2.3	56	3.10	295	140					0.18		0.13			
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1300	7.20	149	1306	84	1193	0.98	0.40	0.25	0.020		73	1.0	135	3.07	278	160					0.10		0.23			
06-May-86																											
05-Aug-86																											
21-Oct-86	1320	7.30	144	1380	80	1773	2.00	0.64	0.40			15	37	1.5	1.5	126	3.00	311	162	0.01	<.02	0.44	<.05	0.40	<.05	0.30	<.05	<.
02																											

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 14- III

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	6500	7.5	240	4150		4075	0.58		0.15	0.060			3	343	11.60	474	805			ND	ND	ND	6.50	0.30	0.60	ND	< .1
28-Aug-80	6380	7.7	231	4410		4130	0.44		0.09	0.045	1.00		1	364	12.40	533	845			< .01	< .01	<.05	0.10	< .1	0.55	0.10	0.02
27-Oct-80	7000	7.5	240																								
28-Nov-80	9000	7.0	212																								
23-Dec-80	7000	7.5	227																								
05-Feb-81	6500	7.0	229																								
02-Mar-81	6000	7.1	270																								
25-Mar-81	6000	7.1	227																								
29-Apr-81	5500	7.2	243																								
22-May-81	7000	7.1	178																								
25-Jun-81	5200	7.5	305																								
29-Jul-81	5500	7.4	243																								
07-Aug-81	4750	7.4	258																								
29-Sep-81	6000	7.3	212																								
15-Oct-81	6000	6.6	135	1885		2750	0.80		0.04	0.205	0.20			430	3.70	515	700		0.10	ND	ND	ND	5.40	ND	0.70	ND	.03
25-Mar-82	3750	7.3	220																								
26-May-82	5500	6.9	38																								
22-Jun-82	4500	7.2	10																								
30-Jul-82	6000	6.8	24																								
25-Aug-82	2450	6.7	171																								
19-Oct-82	DRY																										
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	3600	6.9	141	3100		2850	0.24		0.10	0.357	10	18									< .1	<.05	0.23			<.02	0.03
10-Apr-84																											
17-Jul-84																											
15-Oct-84	3600	6.6	122	1484	84	2421	1.40	0.50	0.85	0.020		38.0	2.9	260	22.30	450	320						<.05		0.14		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1800	7.6	119	2420	294	2557	4.59	0.23	0.43	0.020		29.0	4.0	286	21.50	387	320						0.10		0.44		
06-May-86																											
05-Aug-86																											
21-Oct-86	1990	7.2	122	2800	320	498	0.20	0.34	0.30000000			27	22.0	3.0	7.5	294	23.00	323	360	0.01	<.02		0.72	0.35	2.50	<.05	0.60	<.05	0

.02

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 17- I

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	3200	7.7	256	1600		1510	0.43		<.05	0.007	1.80		1	348	5.20	495	166						0.08				
28-Aug-80	3100	7.8	260	1690		1540	1.10		<.05	0.022	0.80		<.05	170	5.00	391	168						0.74				
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	2700	7.5	174																								
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82	2600	7.6	171	1390		1285	ND		0.08	ND		60									<.01	0.03	0.07		0.02	0.02	
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	1600	7.0	118	1140		925				0.70		< 1	7								< .1	<.05	0.14		<.02		
<.01																											
10-Apr-84																											
17-Jul-84																											
15-Oct-84	2400	6.6	208	2284	244	1330	0.40	0.64		0.005		125	1.7	62	4.10	445	130						<.05		0.50		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1200	7.7	63	482	202	614	5.07	3.80	0.14	0.010		59	2.5	211	3.50	113	55								0.39		
06-May-86																											
05-Aug-86																											
21-Oct-86	1280	7.8	117	1130	130	1211	0.36	0.58	0.30			20	24	1.0	2.0	123	2.00	206	78	0.01	<.02	0.41	<.05	0.40	<.05	1.20	<.05	0.02

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 17- II

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	3100	8.0	190	720		1100	40.00		0.14	0.040	15.00			3	140	35.00	269	76					0.14				
28-Aug-80	2830	7.8	186	930		1190	18.00		<.05	0.027	7.30			1	278	17.00	216	104					0.18				
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	2300	8.0	121																								
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82	2250	7.7	100	795		985	0.53		0.16	ND		45									<.01	0.03	0.16		0.01	0.01	
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	1400	7.6	65	650		725	3.24		0.30	0.020	< 1	19									< .1	<.05	<.05		<.02	<.01	
10-Apr-84																											
17-Jul-84																											
15-Oct-84	1650	6.7	84	2948	154	784	3.20	3.12	0.95	0.014		29	2.2		225	3.30	150	60						0.13	0.30		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1200	7.6	144	1152	136	1262	0.44	0.40	0.10	0.010		618	1.8		150	4.80	254	130					4.00		1.31		
06-May-86																											
05-Aug-86																											
21-Oct-86	900	7.2	58	560	130	665	1.40	0.52	0.60		72.00	25	2.0	3.0	144	6.00	83	43	0.10	<.02	0.21	<.05	0.30	<.05	0.50	<.05	0.03

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 17- III

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	2350	7.6	38	1100		1150	3.00		0.30					3.0	101	18.00	230	142					0.21				
28-Aug-80	2280	8.0	60	1040		1140	1.00		0.33					< .5	167	19.00	212	133					0.82				
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	2200	7.00	38																								
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82	1550	7.30	32	676		605	6.83		3.17	ND		22									0.01	0.14	3.17			0.04	0.04
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	1300	7.30	30	950		775	0.44		0.10	0.816	< 1	51									< .1	<.05	0.06		<.02		0.02
10-Apr-84																											
17-Jul-84																											
15-Oct-84	1300	7.30	36	1216	184	546	2.60	2.64	1.20	0.013		49	1.4		115	19.50	190	80				<.05		< .1		
25-Feb-85																											
11111110-Apr-85																											
17-Jul-85																											
29-Oct-85	850	7.15	28	630	223	511	5.01	3.70	0.48	0.010		118	2.8		98	10.30	160	72					0.20		0.12		
06-May-86																											
05-Aug-86																											
21-Oct-86	910	7.50	35	790	180	716	3.24	0.90	2.70		72.00	59	3.5	6.5	94	20.00	114	71	0.36	<.02	0.25	<.05	1.50	<.05	0.10	<.05	0.02

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 22- I

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	2900	7.7	260	1400		1420	0.62	<.05	0.007	1.70		2	48	5.30	132	155			ND	ND	ND	0.40	0.10	0.40	ND	ND
28-Aug-80	2680	7.7	205	1405		1310	0.70	0.15	0.030	0.50		< .5	143	4.80	297	159			< .01	< .02	<.05	0.15	< .1	0.20	<.05	<.01
27-Oct-80	2500	8.0	150																								
28-Nov-80	3000	7.5	217																								
23-Dec-80																											
05-Feb-81	2250	7.4	186																								
02-Mar-81	2800	7.6	240																								
25-Mar-81	2700	7.3	159																								
29-Apr-81	2100	7.4	152																								
22-May-81	2500	7.0	167																								
25-Jun-81	2400	7.2	380																								
29-Jul-81	2000	7.3	243																								
07-Aug-81	2400	7.1	281																								
29-Sep-81	3000	7.4	243																								
15-Oct-81	2900	7.1	260	790		1450	1.80	0.08	0.003				170	47.10	400	135	0.08	ND	ND	ND	0.60	ND	0.30	ND	0.04
25-Mar-82	2050	7.5	258																								
26-May-82	3200	6.8	112																								
22-Jun-82	3200	7.1	10																								
30-Jul-82	5500	7.2	81																								
25-Aug-82	850	7.2	112																								
19-Oct-82	600	7.7	53	2250		120	0.24	0.75												0.06	<.01	0.24			0.13	<.01
28-Jan-83	FROZEN																										
26-Apr-83	1350	7.5		750		670	4.80	0.07				176								< .1	0.07	32			<.05	0.42
28-Jul-83	NO SAMPLE																										
31-Oct-83	900	7.2	69	600		365	2.08	0.07	0.102	8.00	75									< .1	<.05	0.13			<.02	0.07
10-Apr-84	NO SAMPLE			MONITOR DESTROYED (IN FRONT OF GARAGE DOORS)																							
17-Jul-84	NO SAMPLE																										
15-Oct-84	NO SAMPLE																										
25-Feb-85	NO SAMPLE																										
10-Apr-85	NO SAMPLE																										
17-Jul-85	NO SAMPLE																										
29-Oct-85	NO SAMPLE																										
06-May-86	NO SAMPLE																										
05-Aug-86	NO SAMPLE																										
21-Oct-86	NO SAMPLE																										

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 22- II

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	5650	7.3	129	3900		4350	0.13	<.05	0.014			4	270	7.20	486	707		ND	ND	ND	3.00	0.20	3.00	< .1	0.10
28-Aug-80			136	4160			0.55		0.028			<.05	253	7.30	459	788		< .01	< .02	<.05	0.15	<.1	0.15	0.10	<.01
27-Oct-80	6000	7.0	150																								
28-Nov-80	7000	7.5	121																								
23-Dec-80																											
05-Feb-81	2000	7.2	69																								
02-Mar-81	5000	7.1	180																								
25-Mar-81	5000	7.0	98																								
29-Apr-81	5000	8.0	121																								
22-May-81	6000	8.2	129																								
25-Jun-81	4300	8.0	165																								
29-Jul-81	4250	8.0	121																								
07-Aug-81	4500	7.8	144																								
29-Sep-81	6500	7.2	129																								
15-Oct-81	5000	6.6	130	2150		2750	1.40	0.06	0.010	0.05			290	4.00	500	820	1.00	ND	ND	< .1	3.30	1.50	3.40	ND	0.60
25-Mar-82	3600	7.0	129																								
26-May-82	2350	6.6	135																								
22-Jun-82	1200	7.6	127																								
30-Jul-82	5200	7.2	143																								
25-Aug-82	700	7.3	108																								
19-Oct-82	850	7.5	68	460		280	8.00	0.75				191									0.10	0.09	34.0		0.09	0.20
28-Jan-83	290	7.4	30	142		62	< .1	1.11				51															
26-Apr-83		7.8																			< .1	0.10	15.4		<.05	0.20
28-Jul-83																											
31-Oct-83	900	6.9	90	590		334	2.00				8.00	118									< .1	< .05	<.05		<.02	0.11
10-Apr-84	NO SAMPLE MONITOR DESTROYED (IN FRONT OF GARAGE DOORS)																										
17-Jul-84	NO SAMPLE																										
15-Oct-84	NO SAMPLE																										
25-Feb-85	NO SAMPLE																										
10-Apr-85	NO SAMPLE																										
17-Jul-85	NO SAMPLE																										
29-Oct-85	NO SAMPLE																										
06-May-86	NO SAMPLE																										
05-Aug-86	NO SAMPLE																										
21-Oct-86	NO SAMPLE																										

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 24- I

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	3200	7.70	247	1600		1700	0.17		0.62	0.034	38		4	146	18.60	315	208		ND	ND	ND	0.10	0.10	0.10	ND	ND
28-Aug-80	3170	7.70	549	1630		1800	0.51		<.01	0.022	10		5	138	8.40	342	188		<.01	< .02	<.05	0.10	0.10	< .1	0.05	0.02
27-Oct-80	3500	7.50	300																								
28-Nov-80	3600	7.70	273																								
23-Dec-80	4000	7.50	280																								
05-Feb-81	3750	7.50	227																								
02-Mar-81	3300	7.60	270																								
25-Mar-81	3200	7.80	182																								
29-Apr-81	3000	7.60	280																								
22-May-81	3500	7.10	243																								
25-Jun-81	2600	7.50	330																								
29-Jul-81	2600	8.00	296																								
07-Aug-81	2600	7.30	303																								
29-Sep-81	3500	7.40	258																								
15-Oct-81	3100	7.30	275	830		1550	1.20		0.03	0.012	3			165	4.10	435	155	0.20	ND	ND		0.30	0.30	0.10	ND	ND
25-Mar-82	2300	7.70	281																								
26-May-82	2610	6.00	238																								
22-Jun-82	2500	7.50	237																								
30-Jul-82	2900	7.40	215																								
25-Aug-82	2800	7.00	241																								
19-Oct-82	2950	7.30	230	1209		1430	1.40														0.02	0.09	0.30			0.03	0.01
28-Jan-83	2700	6.90	220	1918		1425	0.10		<.01			29									< .1	0.13	0.59			<.05	0.02
26-Apr-83	2800	7.20	230	1650		1175	0.32		0.01			57									< .1	< .01	4.80			<.05	0.02
28-Jul-83	2940	7.25	245	1550		1675	0.14		< .01	0.897	1	43									0.06	0.09	0.88			0.04	
31-Oct-83	2100	7.30	235	1620		1350	1.28		1.20	0.143	< 1	< 5									< .1	< .05	<.05			<.02	<.01
10-Apr-84	2600	6.90	230	2040		1343	0.94		ND	0.006	ND	7									ND	0.48	2.50			ND	ND
17-Jul-84	NO SAMPLE																										
15-Oct-84	2650	6.70	226	2580	220	955	2.70	1.80	0.75	0.010		41	2.1		166	3.80	702	200					<.05		< .1		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1550	6.40	212	1560	125	1569	1.12	0.58	0.03	0.020		59	1.3		181	5.40	342	210						0.20		0.05	
06-May-86																											
05-Aug-86																											
21-Oct-86	1500	7.70	212	1710	110	2046	10.20	0.76	0.50		52	51	1.5	1.5	174	6.00	341	167	0.05	< .02	0.56	0.10	1.30	<.05	0.10	<.05	<.02

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 24- II

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	4300	7.6	123	2000		2900	0.75		1.60	0.036	30		2	360	29.00	445	268		ND	ND	ND	12.00	0.20	0.60	< .1	0.10
28-Aug-80	4500	7.4	78	2370		3000	0.63		< .1	0.024	23		12	260	15.40	435	377		< .01	< .02	< .05	6.00	<.1	0.50	0.50	0.04
27-Oct-80	5000	7.0	75																								
28-Nov-80	5200	7.5	91																								
23-Dec-80	6000	7.2	83																								
05-Feb-81	5000	7.2	84																								
02-Mar-81	3800	7.2	120																								
25-Mar-81	4000	7.5	61																								
29-Apr-81	3400	7.3	68																								
22-May-81	5000	7.0	61																								
25-Jun-81	3300	7.5	92																								
29-Jul-81	3500	7.5	68																								
07-Aug-81	3250	7.2	61																								
29-Sep-81	4300	7.3	53																								
15-Oct-81	2900	6.7	50	1305		2300			0.06					150	3.50	410	400		0.02	ND	ND	ND	10.50	ND	0.50	ND	ND
25-Mar-82	2600	7.3	45																								
26-May-82	3120	6.9	7																								
22-Jun-82	3100	7.3	8																								
30-Jul-82	3500	6.9	37																								
25-Aug-82	3520	6.9	58																								
19-Oct-82	3450	7.7	53	2252		1945	1.28					15									0.15	0.72	5.00			0.06	0.05
28-Jan-83	3300	7.0	40	2507		2150	0.44		< .01			15									< .1	0.06	5.86			<.05	0.10
26-Apr-83	3200	7.0	43	2250		1750	0.52		0.02	0.035		15									< .1	0.06	14.90			<.05	<.01
28-Jul-83	3380	6.9	40	2320		2150	1.00		< .01	0.016		< 1									0.02	0.04	10.70			0.01	0.04
31-Oct-83	2100	6.9	39	2170		1870	1.16		< .01			< 5									< .1	<.05	0.45			<.02	0.01
10-Apr-84	2800	6.9	43	2140		1781	0.44		ND	0.010		ND									ND	ND	7.60			ND	ND
17-Jul-84																											
15-Oct-84	2900	7.1	50	2660	500	1603	0.70	0.50	0.40	ND		12	2.50		144.00	12	180	360.00				<.05		0.28		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1600	6.9	42	1950	390	1841	0.90	0.36	0.11	0.020		15	2.60	137	4.30	230	310					1.10		0.21		
06-May-86																											
05-Aug-86	120	7.0	25	1540	380	1603	0.80	0.32	0.20			44.1	3.3	98	3.40	229	230					5.70		0.11		
21-Oct-86	1340	7.9	32	1760	430	1910	10.40	0.34	0.10		89	12.0	2.0	2.0 85	3.00	174	245	0.01	<.02	0.36	<.05	8.50	<.05	0.30	<.05	<.02

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 24- III

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	4300	7.40	38	2800		3200	0.41		0.18	0.024	24.00			4	214	16.90	445	440									
28-Aug-80	4050	7.69	1065	2450		2800	0.22		0.15	0.022	2.90			8	144	7.10	444	437									
27-Oct-80	4500	7.00	45																								
28-Nov-80	5000	7.00	61																								
23-Dec-80	6000	7.10	53																								
05-Feb-81	4000	7.20	49																								
02-Mar-81	3800	7.10	90																								
25-Mar-81	3500	7.40	40																								
29-Apr-81	3250	7.30	40																								
22-May-81	3600	7.10	38																								
25-Jun-81	3000	7.00	61																								
29-Jul-81	3000	7.20	45																								
07-Aug-81	3000	7.30	45																								
29-Sep-81	4000	7.30	38																								
15-Oct-81	3350	6.70	35	1150		1950	0.80		0.35					120	3.70	255	380		0.10	ND	ND	ND	3.70	ND	0.50	ND	ND
25-Mar-82	2500	7.30	45																								
26-May-82	3260	6.90	5																								
22-Jun-82	3000	7.20	8																								
30-Jul-82	3820	6.80	37																								
25-Aug-82	3680	6.90	40																								
19-Oct-82	3200	7.60	21	2275		1945	2.08		0.55			14.0									0.02	0.05	2.70		<.01	<.01	
28-Jan-83	2700	7.00	25	2180		1700	0.26		0.63			15.0									0.10	0.02	3.01		<.05	0.02	
26-Apr-83	2650	7.00	5	1840		1475	0.16		0.22	0.026		12.0									<.1	0.04	3.10		<.05	<.01	
28-Jul-83	2820	6.95	3	1930		1765	0.14		<.01	0.012	14.00	3.0									0.08	0.04	3.50		0.03	0.05	
31-Oct-83	2000	6.90	23	1850		1420	1.40		0.10		20.00	< 5									<.1	<.05	<.05		<.02	0.01	
10-Apr-84	2200	6.90	18	1850		1375	0.56		0.10	0.020	1.00	ND									ND	ND	2.40		ND	ND	
17-Jul-84	2700	6.70	23	1950	380	1530	0.16		ND		0.007		ND	24.0		120	ND		100.0	300							
15-Oct-84	1900	6.75	18	972	320	1023	0.50	0.60		ND		26.0			28	6.50	98.0	210					0.13	<.1			
25-Feb-85	1600	7.40	19	1650	400	1280	0.12	0.40	0.10	ND		7.0	24.5		84	2.80	193.0	268					0.95	0.19			
10-Apr-85	2025	7.10	20	1560	340	1228	0.56	0.44	0.06	2.550		12.0	17.5		87	2.60	179.0	258					3.90	0.22			
17-Jul-85	1600	7.12	31	1902	335	1482	0.01	0.04	0.01	0.010		1.7	2.7		95	10.00	132.8	35					4.80	0.24			
29-Oct-85	1000	7.10	14	1140	380	682	0.58	0.34	0.11	0.010		15.0	2.3		61	2.75	157.0	220					0.10	0.06			
06-May-86																											
05-Aug-86	DRY																										
21-Oct-86	910	7.40	9	1020	420	682	18.40	0.28	0.10		17.00	15.0	1.0	1.5	34	2.00	101.0	155	0.01	<.02	0.22	<.05	0.70	<.05	0.10	<.05	<.02

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 25- I

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	2900	7.60	147	1900		1900	0.68		0.10	0.039	107		4.0	134	9.00	268	157		ND	ND	ND	0.80	0.10	0.10	ND	<.1
28-Aug-80	2850	7.50	149	1590		1700	0.47		<.1	0.025	5.30		4.0	120	4.60	329	174		<.01	<.02	<.05	<.05	0.20	<.1	<.05	<.01
27-Oct-80	3100	7.50	180																								
28-Nov-80	3400	7.70	182																								
23-Dec-80	3500	7.30	174																								
05-Feb-81	3000	7.60	152																								
02-Mar-81	1900	7.40	210																								
25-Mar-81	2800	7.90	175																								
29-Apr-81	2700	7.80	197																								
22-May-81	2600	7.50	152																								
25-Jun-81	2500	7.60	180																								
29-Jul-81	2300	7.40	190																								
07-Aug-81	2300	7.50	205																								
29-Sep-81	2750	7.50	167																								
15-Oct-81	2100	7.20	190	735		1450	1.60		0.02	0.049	0.10			150	3.50	310	155		0.08	ND	ND	ND	0.50	ND	<.1	ND	0.02
25-Mar-82	2050	7.80	159																								
26-May-82	2370	6.40	145																								
22-Jun-82	2250	7.50	138																								
30-Jul-82	2600	7.10	142																								
25-Aug-82	2680	7.20	141																								
19-Oct-82	2750	7.70	142	1581		1285	1.04		0.05			22									0.08	0.34	0.58			0.03	0.01
28-Jan-83	DRY																										
26-Apr-83	2450	7.25	152	1270		1150	0.92		0.01		0.40	7									<.1	0.01	1.10			<.05	<.01
28-Jul-83	2650	7.25	156	1330		1352	0.50		<.01	0.049	1.00	3									0.06	0.05	2.10			0.02	0.02
31-Oct-83	2300	7.20	144	1380		1230	0.92		0.10	0.265	20.0	12									<.1	<.05	<.05			<.02	0.01
10-Apr-84	2300	7.00	160	1320		1343	1.52		ND	0.002	1.00										ND	ND	1.20			ND	ND
17-Jul-84																											
15-Oct-84	2400	6.90	148	1350	62	1228	0.70	0.90		0.001		15	1.1	205	9.00	275	140						0.10	<.1			
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1500	6.50	13	1220	75	1296	1.16	0.52	0.13	0.010		15	1.3	193	20.40	254	160						0.10		0.10		
06-May-86																											
05-Aug-86																											
21-Oct-86	1460	7.50	135	1340	100	1722	16.80	0.58	0.10		9.00	26	2.0	6.0	186	4.00	212	153	0.01	<.02	0.44	<.05	0.75	<.05	0.05	<.05	0.04

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 25- II

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	2900	7.60	143	1500		1600	0.85		< .1	0.026			3	148	9.50	294	20			ND	ND	ND	< .1	0.20	2.20	0.10	< .1
28-Aug-80	4700	7.90	143	2840		3300	0.47		< .1	0.024	5.20		5	164	9.00	355	565			< .01	< .02	< .05	0.10	<.1	2.30	0.13	0.01
27-Oct-80	5800	7.00		113																							
28-Nov-80	6000	7.00	152																								
23-Dec-80	6000	7.20	121																								
05-Feb-81	6000	7.10	98																								
02-Mar-81	1000	6.80	150																								
25-Mar-81	5500	7.40	106																								
29-Apr-81	5000	7.30	106																								
22-May-81	6000	7.00	98																								
25-Jun-81	5000	7.30	120																								
29-Jul-81	5500	7.10	106																								
07-Aug-81	4750	7.10	106																								
29-Sep-81	6500	7.20	83																								
15-Oct-81	6000	6.50	80	2350		3250	0.80		0.02	0.059				255	3.30	475	970		0.42	ND	ND	ND	0.60	ND	2.50	ND	ND
25-Mar-82	4000	7.00	91																								
26-May-82	6000	6.60	30																								
22-Jun-82	4500	7.10	10																								
30-Jul-82	6500	6.80	21																								
25-Aug-82	6500	6.80	15																								
19-Oct-82	6000	7.40	3	5460		4585	1.28		0.22			441									0.11	0.66	2.20			0.07	0.16
28-Jan-83	6000	6.70	65	5640		5100	0.46		0.11			29									0.20	0.13	0.64			0.06	0.03
26-Apr-83	3250	7.10	6	3100		2300			0.30	0.090		7								<.01		0.01	0.35			<.05	< .01
28-Jul-83	3850	7.00	2	2900		1600	0.29		0.04	0.094	2.00	< 1									0.04	0.07	3.70			0.01	0.04
31-Oct-83	4000	6.90	32	3420		2820	0.32		0.20	0.080	< 1	12								< .1	< .05	<.05				<.02	0.03
10-Apr-84	2500	7.00	11	2160		1718	0.80		0.40	ND	3.00									ND	ND	0.20				ND	ND
17-Jul-84																											
15-Oct-84	2900	6.75	26	1864	430	1910	0.40	0.50	0.40	0.012		26	2.8		102	10.00	155	400				<.05		< .1			
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	2100	7.25	23	3400	580	2728	3.57	0.01	0.13	0.010		338	4.4		142	7.60	254	690				1.90		0.06			
06-May-86																											
05-Aug-86																											
21-Oct-86	1640	7.60	15	2350	480	2728	0.68	0.34	0.20			72	1	2.5	2.5	85	6.00	167	431	0.01	< .02	0.32	0.35	0.30	<.05	0.10	< .05	0.48

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 25- III

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	7200	7.40	57	5400		6000	1.07		0.27	0.023	6.00			4.0	274	17.90	445	590		ND	ND	ND	< .1	0.20	2.20	0.10	< .1
28-Aug-80	7500	7.80	50	5490		6600	0.35		< .1	0.023	1.90			8.0	250	13.20	395	1252		< .01	< .02	< .05	0.10	<.1	2.30	0.13	0.01
27-Oct-80	8000	7.50	57																								
28-Nov-80	10000	7.30	61																								
23-Dec-80	7000	7.50	106																								
05-Feb-81	8000	7.00	61																								
02-Mar-81																											
25-Mar-81	3000	7.70	23																								
29-Apr-81	2600	7.50	23																								
22-May-81	2800	7.30	15																								
25-Jun-81	2400	7.80	30																								
29-Jul-81	2900	7.40	30																								
07-Aug-81	2900	7.40	30																								
29-Sep-81	3000	7.30	23																								
15-Oct-81	2700	6.90	60	975		1550	0.50		1.75	0.092					155	3.10	320	135	0.32	ND	ND		1.30	ND	< .1	ND	ND
25-Mar-82	1900	7.50	15																								
26-May-82	2500	6.60	2																								
22-Jun-82	1900	7.50	8																								
30-Jul-82	2500	7.20	5																								
25-Aug-82	2850	7.00	14																								
19-Oct-82	3200	7.70	1	2225		1760	1.04		0.98			37.0										0.09	0.04	1.20			< .01
< .01																											
28-Jan-83	2050	6.80	55	1722		1250	0.48		1.95			29.0									< .1	0.03	1.12			< .05	0.02
26-Apr-83	2150	7.25	1	1550		1075	0.32		0.21	0.061	0.40	12.0									< .1	<.01	0.33			< .05	0.01
28-Jul-83	2600	7.15	1	1770		1425	0.71		0.20	0.102	1.00	18.0									0.04	0.08	0.87				0.01
31-Oct-83	2300	7.10	8	1820		1260	0.32		1.60		< 1	< 5									< .1	<.05	<.05			< .02	0.03
10-Apr-84	2000	7.10	6	1980		1375	2.40		0.30	0.010	1.00										ND	ND	0.90			ND	ND
17-Jul-84	2800	6.90	17	1980	380	1530	ND		0.73	0.003		3.0	6.2		100	ND	165	345									
15-Oct-84	2900	6.80	12	2404	426	1773	0.40	0.48	0.25	0.014		29.0	2.9		104	11.50	195	420					<.05		< .1		
25-Feb-85	1800	7.50	197	1930	400	1550	0.24	0.40	0.30	ND		1.0	8.4		80	2.30	195	329					0.31		0.07		
10-Apr-85	2250	7.20	5	1780	360	1534	1.32	0.36	0.22	7.650		14.0	28.0		87	1.80	187	304					1.76		< .05		
17-Jul-85	1800	7.29	12	2440	383	2046	ND	0.09	0.02	0.010		<.05	3.1		100	8.00	212	459					3.30		0.11		
29-Oct-85	1900	7.25	15	2855	480	2319	1.50	1.40	0.40	0.010		15.0	4.8		117	8.20	230	510					0.10		0.05		
06-May-86	1800	7.30	10	1902	372	1534	0.68	0.52	0.53	22.440		29.4	4.9		76	2.30	290	432					0.06		0.03		
05-Aug-86	120	6.90	8	2200	360	2217	1.44	0.22	0.20	ND		36.8	8.0		98	3.90	225	385					0.34		< .05		
21-Oct-86	1520	7.50	7	2040	460	2217	0.56	0.76	0.20		32	13.0	4.0	4.0	67	4.00	138	347	0.01	< .02	0.29	<.05	1.30	<.05	0.05	<.05	0.03

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 25- IV

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	5100	7.10	76	3600		3400	0.73		0.64	0.067			3	194	11.10	400	640			ND	ND	ND	0.40	<.1	1.20	< .1	< .1
28-Aug-80																				0.02	< .02	< .05	5.80	1.30	2.10	0.07	0.75
27-Oct-80	6000	7.00	98																								
28-Nov-80	6000	7.00	121																								
23-Dec-80	7000	7.30	106																								
05-Feb-81	6000	7.10	91																								
02-Mar-81	3500	6.90	135																								
25-Mar-81	5000	7.50	98																								
29-Apr-81	4500	7.10	121																								
22-May-81	5000	7.00	91																								
25-Jun-81	4000	7.00	122																								
29-Jul-81	5000	7.00	99																								
07-Aug-81	4000	7.10	106																								
29-Sep-81	5500	7.10	76																								
15-Oct-81																											
25-Mar-82	3300	7.00	83																								
26-May-82	4500	6.80	8																								
22-Jun-82	3500	7.10	6																								
30-Jul-82	4400	6.50	66																								
25-Aug-82																											
19-Oct-82	4300	6.70	1	3115		2640	10.13		0.06			59									0.10	0.11	3.60			0.02	0.03
28-Jan-83	4500	6.80	55	3760		3150	2.68		< .01			30									0.20	0.06	1.51			< .05	0.02
26-Apr-83	4400	6.65	78	3460		2700	1.76		0.02		4.9	18									<.1	0.06	2.02			< .05	0.08
28-Jul-83	4850	6.60	21	3570		3050	8.56		0.01	0.041	22.0	52									0.05		2.72				0.01
31-Oct-83	4100	6.80	135	3410		2760	6.12		0.30	0.357	24.0	40									< .01	< .05	0.20				0.01
10-Apr-84	3800	6.80	64	3380		2718	3.12		1.20	0.006	5.0										ND	ND	4.20			ND	ND
17-Jul-84																											
15-Oct-84	3450	6.90	66	1892	596	2285	10.50	6.32	0.15	0.027		62	3.7		144	15.00	310	448					0.15	< .1			
25-Feb-85	DESTROYED																										
10-Apr-85																											
17-Jul-85																											
29-Oct-85																											
06-May-86																											
05-Aug-86																											
21-Oct-86																											

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 26- I

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80																											
28-Aug-80																											
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81																											
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82																											
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	2625	7.00	180	1740		1650	2.24		0.01	0.010	8.20	353								ND	ND	0.14		ND	0.17		
10-Apr-84	2100	7.00	183	1760		1531	3.60		ND	0.010	31	132								ND	ND	1.40		ND	ND		
17-Jul-84																											
15-Oct-84	3100	6.95	192	1972	154	1739	2.20	1.80		ND		116	10.9		270	18.50	400	220				<.05	< .1				
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1650	6.60	163	1580	115	1705	1.49	0.76	0.10	0.010		59	7.0		222	8.20	303	220				0.10	0.09				
06-May-86																											
05-Aug-86																											
21-Oct-86	1620	7.40	162	1670	170	2080	2.80	1.16	0.50		42	40	2.5	2.5	184	7.00	373	182	0.07	< .02	0.49	< .05	1.20	<.05	0.35	< .05	0.02

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 26- II

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80																											
28-Aug-80																											
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81																											
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82																											
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	2375	7.00	170	1430		1250	1.28		0.01	0.008	6.80	29.0									ND	ND	0.12		ND	ND	
10-Apr-84	2400	6.90	188	1700		1281	1.60		ND	0.006	2.00	15.0									ND	ND	1.20		ND	ND	
17-Jul 84																											
15-Oct-84	2600	6.90	200	1668	180	1159	7.50	1.20		1.000		91.0	10.9		159	12.50	360	190					0.19		0.52		
25-Feb-85	2000	7.30	6	1890	180	1570	1.20	1.20	0.10	ND		14.0	7.8		66	3.60	311	225					0.98		0.71		
10-Apr-85	2670	7.00	209	1880	200	1671	2.08	1.10	0.18	3.050		13.0	11.0		172	4.00	310	229					1.76		0.58		
17-Jul-85	1800	7.21	197	1668	188	1295	0.05	0.02	0.01	0.080		5.0	3.6		171	5.00	314	217					2.80		0.72		
29-Oct-85	1650	6.95	195	1705	205	1534	1.60	1.02	0.17	0.010		29.0	2.1		190	4.10	324	230					0.30		0.55		
06-May-86	2300	7.20	22	1812	166	1705	1.04	0.80	0.53	17.340		88.2			193	3.50	439	340					2.18		0.61		
05-Aug-86	120	6.70	191	1910	165	1138	0.02	0.18	0.30	ND		44.1	6.4		185	4.00	409	225					1.50		0.48		
21-Oct-86	1660	7.30	196	1930	210	2302	1.40	0.62	0.10		7.00	94.0	1.0	3	169	4.00	310	226	0.01	< .02	0.51	< .05	2.20	<.05	0.50	< .05	0.05

GLANBROOK LANDFILL SITE
GROUNDWATER QUALITY DATA

BOREHOLE 26- III

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80																											
28-Aug-80																											
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81																											
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82																											
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83																											
10-Apr-84	2100	7.00	33	1800		1625	ND		3.10	0.012	2.00	15															
17-Jul-84	2750	7.00	13	1760	370	1550	0.30		3.47	0.015		8	3.9		155	ND		210	255			ND		ND	0.10		ND	ND
15-Oct-84	DRY																										
25-Feb-85	DRY																										
10-Apr-85	DRY																										
17-Jul-85	DRY																										
29-Oct-85	DRY																										
06-May-86	DRY																										
05-Aug-86	DRY																										
21-Oct-86	DRY																										

APPENDIX B

SURFACE WATER CHEMICAL ANALYSES

GLANBROOK LANDFILL SITE
BUCKHORN CREEK - SURFACE WATER DATA

SW 1

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
19-Oct-82	1800	7.1	64.0																								
28-Jan-83	1200	7.2	47.0																								
31-Jan-83	420	6.5	35.0																								
16-May-84	545	7.0	19.0																								
14-Nov-84	500	6.1	22.5																								
29-Oct-85	390	7.3	48.0																								
07-May-86	800	7.8	50.0																								
05-Aug-86	40	6.9	33.0																								
21-Oct-86	490	7.7	31.0	380	180	290	1.04	0.28	0.70		69	54	8.5	10.5	18	6.00	59	50	0.03	< .02	0.12	< .05	1.10	<.05	0.10	< .05	< .02

GLANBROOK LANDFILL SITE
BUCKHORN CREEK - SURFACE WATER DATA

SW 2

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
19-Oct-82	1050	6.9	168.0																								
28-Jan-83	1400	7.0	74.0																								
31-Jan-83	700	6.7	56.0																								
16-May-84	713	7.1	37.0																								
14-Nov-84	600	6.3	27.5																								
29-Oct-85	500	7.5	70.0																								
07-May-86	1800	7.3	80.0																								
05-Aug-86	80	6.6	199.0																								
21-Oct-86	490	7.9	39.0	370	170	225	6.40	0.28	0.80		7.00	41	9.5	10	20	7.00	66	43	0.07	< .02	0.14	<.05	1.00	<.05	0.10	<.05	0.02

GLANBROOK LANDFILL SITE
BUCKHORN CREEK - SURFACE WATER DATA

SW 3

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
19-Oct-82	1200	6.9	86.0																								
28-Jan-83	NO SAMPLE																										
31-Jan-83	650	7.3	53.0																								
16-May-84	772	7.3	40.0																								
14-Nov-84	650	6.4	36.0																								
29-Oct-85	700	7.6	73.0																								
07-May-86	1800	7.3	80.0																								
05-Aug-86	100	6.9	186.0																								
21-Oct-86	520	7.7	69.0	580	190	426	2.92	0.22	0.70		47	43	8.0	9.5	36	7.00	117	55	0.05	< .02	0.26	< .05	0.95	<.05	0.20	< .05	<.02

GLANBROOK LANDFILL SITE

METHANE GAS RESULTS

RESULTS IN % METHANE

DATE	GM 1	GM 2	GM 3	GM 4	GM 5
23-Dec-83	0.00	0.00	0.25	NA	0.00
31-Jan-84	0.25	0.20	0.20	0.25	0.00
02-Feb-84	0.25	0.20	0.20	0.25	0.00
27-Apr-84	0.25	0.25	0.25	0.25	0.00
17-Aug-84	0.90	0.00	0.00	0.00	0.00
27-Dec-84	0.00	0.00	0.00	0.00	0.00
23-Apr-85	0.00	0.00	0.00	0.00	0.00

APPENDIX C

LEACHATE QUALITY DATA

GLANBROOK LANDFILL SITE
LEACHATE QUALITY DATA

MANHOLE 1

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
29-Apr-81	2600	6.80	99.00																								
22-May-81	2250	7.20	45.00																								
25-Jun-81	1900	7.00	45.00																								
29-Jul-81																											
27-Aug-81																											
29-Sep-81	4000	7.10	61.00																								
25-Mar-82	230	7.50	8.00																								
19-Oct-82	2900	7.60	0.70	23		1400	4.32					29									0.04	0.02	3.40			0.04	0.52
31-Oct-82																											
28-Jan-83	1800	6.90	37.50																								
26-Apr-83	4900	7.00	310.00																								
28-Jul-83	6000	6.90	285.00																								
31-Oct-83	800	6.90	900.00																								
17-Jul-84	6500	6.50	500.00																								
23-Oct-84	5000	7.20	32.00																								
25-Feb-85	7000	6.40	750.00																								
10-Apr-85	4725	7.30	740.00																								
17-Jul-85	3400	7.30	695.00																								
29-Oct-85	3150	7.40	120.00																								
06-May-86																											
05-Aug-86	800	6.80	2175.00	4010	5580	10	38.00	170	2.60		2180	706	97.5	129	875	314	116	980	1.26	<.02	0.33	<.05	11.70	0.10	0.1	0.20	0.28
21-Oct-86																											

GLANBROOK LANDFILL SITE
LEACHATE QUALITY DATA

MANHOLE 2

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
29-Apr-81																										
22-May-81																										
25-Jun-81																										
29-Jul-81																										
27-Aug-81																										
29-Sep-81																										
25-Mar-82																										
19-Oct-82																										
31-Oct-82	2900	7.50	0.70	2093		1540	4.32		0.01			44									ND	0.01	1.79		0.02	0.30
28-Jan-83																										
26-Apr-83																										
28-Jul-83																										
31-Oct-83	6000	6.95	225.00																							
17-Jul-84																										
23-Oct-84																										
25-Feb-85																										
10-Apr-85																										
17-Jul-85																										
29-Oct-85																										
06-May-86																										
05-Aug-86																										
21-Oct-86																										

GLANBROOK LANDFILL SITE
LEACHATE QUALITY DATA

MANHOLE 3

DATE	CONDUCT	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL	AMMONIA	NITRATE	PHENOL	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
	uMHOS/CM						AS N			ug/L																	
29-Apr-81	2050	7.00	53.00																								
22-May-81	2500	7.10	38.00																								
25-Jun-81	2500	7.00	91.00																								
29-Jul-81	2600	7.40	61.00																								
27-Aug-81	2700	7.80	53.00																								
29-Sep-81	3000	7.60	53.00																								
25-Mar-82	1200	8.00	23.00																								
19-Oct-82	3300	7.50	0.50	2335		1720	8.32		0.01		22										ND		ND	0.65		0.03	0.02
31-Oct-82																											
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	2000	6.80	43.00																								
17-Jul 84																											
23-Oct-84																											
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85																											
06-May-86																											
05-Aug-86																											
21-Oct-86																											

98% Trows.

GLANBROOK LANDFILL SITE
LEACHATE QUALITY DATA

MANHOLE 4

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
29-Apr-81	1850	7.20	40.00																								
22-May-81	2100	7.10	53.00																								
25-Jun-81	2900	7.00	91.00																								
29-Jul-81	2500	7.20	61.00																								
27-Aug-81	2600	7.50	68.00																								
29-Sep-81	3000	7.30	45.00																								
25-Mar-82	2700	7.30	83.00																								
19-Oct-82	3550	7.40	0.50	2580		1650	10.12					59									ND		1.10			0.02	0.01
31-Oct-82	2100	6.80	60.00																								
28-Jan-83																											
26-Apr-83	3350	6.90	110.00																								
28-Jul-83	4000	6.70	100.00																								
31-Oct-83	3900	5.50	275.00																								
24-Apr-83	8000	6.90	100.00																								
17-Jul-84	2400	6.30	145.00																								
23-Oct-84	1600	6.80	29.00																								
25-Feb-85	1100	6.10	80.00																								
10-Apr-85	1275	6.60	47.00																								
17-Jul-85	1100	7.40	75.00																								
29-Oct-85	1600	6.70	238.00																								
06-May-86	500	7.00	566.00																								
05-Aug-86	700	7.50	750.00																								
21-Oct-86	2350	7.20	0.50	3880	4890	43	800.00	190	3.90	177	1353	190	190	880	404	255	493	2.80	< .02	0.53	< .05	8.10	0.10	0.9	0.25	1.90

GLANBROOK LANDFILL SITE

LEACHATE QUALITY DATA

BOREHOLE 5

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
29-Apr-81																										
22-May-81																										
25-Jun-81																										
29-Jul-81																										
27-Aug-81																										
29-Sep-81																										
25-Mar-82																										
19-Oct-82																										
31-Oct-82																										
28-Jan-83																										
26-Apr-83	2700	6.90		57.00																						
28-Jul-83																										
31-Oct-83																										
17-Jul-84																										
23-Oct-84																										
25-Feb-85																										
10-Apr-85																										
17-Jul-85																										
29-Oct-85																										
06-May-86																										
05-Aug-86																										
21-Oct-86																										

GLANBROOK LANDFILL SITE
LEACHATE QUALITY DATA

MANHOLE 6

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
29-Apr-81																										
22-May-81																										
25-Jun-81																										
29-Jul-81																										
27-Aug-81																										
29-Sep-81																										
25-Mar-82																										
19-Oct-82																										
31-Oct-82																										
28-Jan-83																										
26-Apr-83	2550	7.00		42.00																						
28-Jul-83																										
31-Oct-83																										
17-Jul-84																										
23-Oct-84																										
25-Feb-85																										
10-Apr-85																										
17-Jul-85																										
29-Oct-85																										
06-May-86																										
05-Aug-86																										
21-Oct-86																										

GLANBROOK LANDFILL SITE
LEACHATE QUALITY DATA

MANHOLE 7

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA AS N	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHOROUS	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
29-Apr-81																										
22-May-81																										
25-Jun-81																										
29-Jul-81																										
27-Aug-81																										
29-Sep-81																										
25-Mar-82																										
19-Oct-82																										
31-Oct-82																										
28-Jan-83																										
26-Apr-83	2100	7.00		41.00																						
28-Jul-83																										
31-Oct-83																										
17-Jul-84																										
23-Oct-84																										
25-Feb-85																										
10-Apr-85																										
17-Jul-85																										
29-Oct-85																										
06-May-86																										
05-Aug-86																										
21-Oct-86																										

APPENDIX D

WATER LEVEL DATA

GLANBROOK LANDFILL SITE
GROUNDWATER LEVEL DATA

BOREHOLE 1A

	MONITOR I	MONITOR II	MONITOR III
	TYPE P	TYPE P	TYPE P
	DEPTH (m) 19.50	DEPTH (m) 10.50	DEPTH (m) 6.10
	GROUND ELEV. 191.19 (m a.s.l.)	GROUND ELEV. 191.19 (m a.s.l.)	GROUND ELEV. 191.19 (m a.s.l.)
DATE	GROUND WATER ELEVATIONS (m a.s.l.)		
27-Oct-80			
28-Nov-80			
23-Dec-80			
05-Feb-81			
02-Mar-81			
25-Mar-81			
28-Apr-81			
20-May-81			
25-Jun-81			
29-Jul-81			
26-Aug-81			
29-Sep-81			
15-Oct-81	187.60	188.00	190.40
25-Mar-82			
22-Oct-82	187.00	187.60	189.90
28-Jan-83			
26-Apr-83			
28-Jul-83			
31-Oct-83	187.02	187.40	189.73
24-Apr-84			
17-Jul-84			
15-Oct-84	187.24	187.71	189.84
25-Feb-85			
10-Apr-85			
17-Jul-85			
29-Oct-85	187.61	189.20	189.61
06-May-86			
05-Aug-86			
21-Oct-86	187.95	190.74	190.27

GLANBROOK LANDFILL SITE
GROUNDWATER LEVEL DATA

	BOREHOLE 5		
MONITOR	I	II	III
TYPE	P	P	S
DEPTH (m)	11.70	8.80	7.00
GROUND ELEV. (m a.s.l.)	189.88	189.88	189.88
DATE	GROUND WATER ELEVATIONS (m a.s.l.)		
27-Oct-80			
28-Nov-80			
23-Dec-80			
05-Feb-81			
02-Mar-81			
25-Mar-81			
28-Apr-81			
20-May-81			
25-Jun-81			
29-Jul-81			
26-Aug-81			
29-Sep-81			
15-Oct-81	186.70	189.60	188.90
25-Mar-82			
22-Oct-82	184.70	185.90	188.30
28-Jan-83			
26-Apr-83			
28-Jul-83			
31-Oct-83	186.71	186.50	188.44
24-Apr-84			
17-Jul-84			
15-Oct-84	185.69	188.65	188.17
25-Feb-85			
10-Apr-85			
17-Jul-85			
29-Oct-85	185.69	185.69	DRY
06-May-86			
05-Aug-86			
21-Oct-86	186.24	186.50	188.71

GLANBROOK LANDFILL SITE

GROUNDWATER LEVEL DATA

BOREHOLE 12

	MONITOR TYPE	I P	MONITOR TYPE	II P	MONITOR TYPE	III P
	DEPTH (m)	14.30	DEPTH (m)	10.80	DEPTH (m)	6.10
	GROUND ELEV. (m a.s.l.)	191.47	GROUND ELEV. (m a.s.l.)	191.50	GROUND ELEV. (m a.s.l.)	191.50
DATE	GROUND WATER ELEVATIONS (m a.s.l.)					
27-Oct-80						
28-Nov-80						
23-Dec-80						
05-Feb-81						
02-Mar-81						
25-Mar-81						
28-Apr-81						
20-May-81						
25-Jun-81						
29-Jul-81						
26-Aug-81						
29-Sep-81						
15-Oct-81	187.10		187.30		187.80	
25-Mar-82						
22-Oct-82	187.00		186.70		185.80	
28-Jan-83						
26-Apr-83						
28-Jul-83						
31-Oct-83	187.06		186.73		185.74	
24-Apr-84						
17-Jul-84						
15-Oct-84	187.03		186.75		185.77	
25-Feb-85						
10-Apr-85						
17-Jul-85						
29-Oct-85	186.91		186.34		DRY	
06-May-86						
05-Aug-86						
21-Oct-86	187.05		186.82		186.65	

GLANBROOK LANDFILL SITE
GROUNDWATER LEVEL DATA

BOREHOLE 13

	MONITOR I	MONITOR II	MONITOR III	MONITOR IV
	TYPE P	TYPE p	TYPE S	TYPE S
	DEPTH (m) 18.70	DEPTH (m) 18.70	DEPTH (m) 12.20	DEPTH(m) 5.20
	GROUND ELEV. 189.72	GROUND ELEV. 189.72	GROUND ELEV. 189.72	GROUND ELEV. 189.88
	(m a.s.l.)	(m a.s.l.)	(m a.s.l.)	(m a.s.l.)
DATE	GROUND WATER ELEVATIONS (m a.s.l.)			
27-Oct-80	184.70	185.20		188.50
28-Nov-80	183.60	187.20		188.40
23-Dec-80	183.80	187.10		188.60
05-Feb-81	185.30	186.90		188.60
02-Mar-81	184.90			189.00
25-Mar-81	182.60	187.10		188.80
28-Apr-81	183.80	187.10		189.20
20-May-81	183.80	187.10		189.20
25-Jun-81	181.40	187.20		189.00
29-Jul-81	182.70	187.20		188.70
26-Aug-81	184.30	187.10		188.30
29-Sep-81	184.10	184.10		188.80
15-Oct-81	181.40	187.20		188.80
25-Mar-82	185.90	187.20		
22-Oct-82	185.20	187.00	187.00	188.10
28-Jan-83	185.94	187.00	187.03	188.97
26-Apr-83	186.01	187.22	187.23	189.25
28-Jul-83	185.34	187.01	187.01	191.89
31-Oct-83	185.04	187.00	187.01	188.29
24-Apr-84	186.38	187.15	187.16	189.26
17-Jul-84	185.30	187.12	187.11	188.66
15-Oct-84	186.38	187.07	187.07	188.09
25-Feb-85	186.51	187.13	187.14	188.82
10-Apr-85	186.67	187.23	187.25	189.30
17-Jul-85				188.08
29-Oct-85	186.90	186.83	186.91	186.73
06-May-86				
05-Aug-86	186.96		187.11	
21-Oct-86	187.04		187.17	

GLANBROOK LANDFILL SITE
GROUNDWATER LEVEL DATA

BOREHOLE 14

MONITOR	I	MONITOR	II	MONITOR	III
TYPE	P	TYPE	P	TYPE	P
DEPTH (m)	19.70	DEPTH (m)	15.20	DEPTH (m)	9.10
GROUND ELEV. (m a.s.l.)	194.11	GROUND ELEV. (m a.s.l.)	194.11	GROUND ELEV. (m a.s.l.)	194.30

DATE	GROUND WATER ELEVATIONS (m a.s.l.)		
27-Oct-80	185.30	187.50	190.50
28-Nov-80	185.80	187.80	190.50
23-Dec-80	185.60	187.80	190.70
05-Feb-81	185.60	187.70	189.60
02-Mar-81	186.00	188.00	191.00
25-Mar-81	185.90	187.90	190.90
28-Apr-81	185.80	187.80	191.20
20-May-81	185.80	187.80	191.20
25-Jun-81	186.20	188.00	191.30
29-Jul-81	185.80	188.00	190.90
26-Aug-81	185.80	188.60	191.10
29-Sep-81	185.70	188.00	191.30
15-Oct-81	185.90	187.80	191.40
25-Mar-82	185.90	188.20	191.60
22-Oct-82	185.50	188.00	190.50
28-Jan-83			
26-Apr-83			
28-Jul-83			
31-Oct-83	185.65	188.11	191.03
24-Apr-84			
17-Jul-84			
15-Oct-84	185.70	188.14	191.15
25-Feb-85			
10-Apr-85			
17-Jul-85			
29-Oct-85	185.60	187.70	190.53
06-May-86			
05-Aug-86			
21-Oct-86			

GLANBROOK LANDFILL SITE
GROUNDWATER LEVEL DATA

BOREHOLE 17

	MONITOR I	MONITOR II	MONITOR III
	TYPE P	TYPE P	TYPE S
	DEPTH (m) 9.60	DEPTH (m) 8.70	DEPTH (m) 5.30
	GROUND ELEV. 188.60 (m a.s.l.)	GROUND ELEV. 188.60 (m a.s.l.)	GROUND ELEV. 188.60 (m a.s.l.)
DATE	GROUND WATER ELEVATIONS (m a.s.l.)		
27-Oct-80			
28-Nov-80			
23-Dec-80			
05-Feb-81			
02-Mar-81			
25-Mar-81			
28-Apr-81			
20-May-81			
25-Jun-81			
29-Jul-81			
26-Aug-81			
29-Sep-81			
15-Oct-81	187.20	187.30	187.60
25-Mar-82			
22-Oct-82	187.10	187.10	185.80
28-Jan-83			
26-Apr-83			
28-Jul-83			
31-Oct-83	187.16	187.15	186.92
24-Apr-84			
17-Jul-84			
15-Oct-84	187.17	187.27	186.83
25-Feb-85			
10-Apr-85			
17-Jul-85			
29-Oct-85	187.10	187.09	186.26
06-May-86			
05-Aug-86			
21-Oct-86			

GLANBROOK LANDFILL SITE
GROUNDWATER LEVEL DATA

BOREHOLE 22

MONITOR	I	MONITOR	II
TYPE	P	TYPE	S
DEPTH (m)	10.70	DEPTH (m)	5.80
GROUND ELEV. (m a.s.l.)	190.75	GROUND ELEV. (m a.s.l.)	190.75

DATE	GROUND WATER ELEVATIONS (m a.s.l.)	
27-Oct-80	185.40	188.20
28-Nov-80	187.30	188.00
23-Dec-80		
05-Feb-81	187.30	188.10
02-Mar-81	187.40	188.70
25-Mar-81	187.20	188.70
28-Apr-81	187.20	189.00
20-May-81	187.20	189.00
25-Jun-81	187.40	189.00
29-Jul-81	187.40	188.90
26-Aug-81	187.20	188.70
29-Sep-81	187.30	189.00
15-Oct-81	187.30	189.00
25-Mar-82	187.40	189.50
22-Oct-82	187.10	189.00
28-Jan-83		187.26
26-Apr-83	189.58	187.69
28-Jul-83	190.45	188.99
31-Oct-83	187.33	188.90
24-Apr-84		
17-Jul-84		
15-Oct-84		
25-Feb-85		
10-Apr-85		
17-Jul-85		
29-Oct-85	NA	NA
06-May-86		
05-Aug-86		
21-Oct-86		

GLANBROOK LANDFILL SITE
GROUNDWATER LEVEL DATA

BOREHOLE 24

	MONITOR I	MONITOR II	MONITOR III
	TYPE P	TYPE P	TYPE S
	DEPTH (m) 12.20	DEPTH (m) 7.00	DEPTH (m) 3.70
	GROUND ELEV. 189.36 (m a.s.l.)	GROUND ELEV. 189.37 (m a.s.l.)	GROUND ELEV. 189.36 (m a.s.l.)
DATE	GROUND WATER ELEVATIONS (m a.s.l.)		
27-Oct-80	185.00	187.60	187.60
28-Nov-80	186.90	187.70	187.70
23-Dec-80	186.90	187.50	187.50
05-Feb-81	186.80	187.50	187.50
02-Mar-81	187.00	188.00	188.00
25-Mar-81	186.90	187.70	187.70
28-Apr-81	186.90	187.80	187.80
20-May-81	186.90	187.70	187.70
25-Jun-81	186.80	187.80	187.80
29-Jul-81	186.90	188.00	188.00
26-Aug-81	186.90	187.40	187.50
29-Sep-81	186.90	187.70	187.70
15-Oct-81	186.80	187.60	187.60
25-Mar-82	187.00	188.00	188.00
22-Oct-82	186.70	187.50	187.50
28-Jan-83	186.83	187.63	187.63
26-Apr-83	186.98	187.73	187.75
28-Jul-83	186.73	187.09	187.08
31-Oct-83	186.78	187.79	187.79
24-Apr-84	186.93	187.83	187.82
17-Jul-84	186.83	187.30	187.30
15-Oct-84	186.87	187.49	187.50
25-Feb-85	186.90	187.52	187.63
10-Apr-85	186.99	187.86	187.86
17-Jul-85			186.77
29-Oct-85	186.71	187.50	187.50
06-May-86	186.84	187.67	187.68
05-Aug-86	186.84	187.52	187.52
21-Oct-86	186.89	187.86	187.86

GLANBROOK LANDFILL SITE
GROUNDWATER LEVEL DATA

BOREHOLE 25

	MONITOR I	MONITOR II	MONITOR III	MONITOR IV
	TYPE P	TYPE P	TYPE S	TYPE S
	DEPTH (m) 15.20	DEPTH (m) 7.30	DEPTH (m) 4.30	DEPTH(m) 7.30
	GROUND ELEV. 193.17 (m a.s.l.)	GROUND ELEV. 193.17 (m a.s.l.)	GROUND ELEV. 193.17 (m a.s.l.)	GROUND ELEV. 193.11 (m a.s.l.)
DATE	GROUND WATER ELEVATIONS (m a.s.l.)			
27-Oct-80	185.10	188.50	189.70	188.40
28-Nov-80	187.00	188.60	189.60	188.60
23-Dec-80	186.90	188.70	190.00	188.80
05-Feb-81	186.80	188.70	189.70	188.70
02-Mar-81	187.00	189.20		188.90
25-Mar-81	186.80	189.10	191.30	189.20
28-Apr-81	186.90	189.30	192.20	189.30
20-May-81	186.90	189.40	192.30	189.50
25-Jun-81	187.00	189.40	191.70	189.50
29-Jul-81	186.90	189.40	191.70	189.50
26-Aug-81	186.90	189.40	190.70	189.40
29-Sep-81	187.00	189.50	191.60	188.00
15-Oct-81	186.90	189.50	191.80	
25-Mar-82	187.10	189.90	192.20	190.00
22-Oct-82	186.80	189.50	190.50	189.50
28-Jan-83	186.82	190.91	192.03	189.88
26-Apr-83	187.00	190.03	192.22	190.30
28-Jul-83	186.81	189.75	191.07	189.82
31-Oct-83	186.89	188.30	191.37	188.27
24-Apr-84	186.97	189.93	191.84	189.75
17-Jul-84	186.91	189.64	190.46	189.58
15-Oct-84	186.92	189.37	189.81	189.32
25-Feb-85	186.96	189.96	189.87	DESTROYED
10-Apr-85	187.05	190.50	192.05	
17-Jul-85			189.09	
29-Oct-85	186.72	189.44	189.52	
06-May-86	186.92	190.47	191.60	
05-Aug-86	186.89	189.71	189.75	
21-Oct-86	186.93	190.39	191.57	

GLANBROOK LANDFILL SITE
GROUNDWATER LEVEL DATA

BOREHOLE 26

	MONITOR	I	MONITOR	II	MONITOR	III
	TYPE	P	TYPE	P	TYPE	P
	DEPTH (m)	11.58	DEPTH (m)	7.62	DEPTH (m)	3.05
	GROUND ELEV. (m a.s.l.)	190.85	GROUND ELEV. (m a.s.l.)	190.85	GROUND ELEV. (m a.s.l.)	190.85
DATE	GROUND WATER ELEVATIONS (m a.s.l.)					
27-Oct-80						
28-Nov-80						
23-Dec-80						
05-Feb-81						
02-Mar-81						
25-Mar-81						
28-Apr-81						
20-May-81						
25-Jun-81						
29-Jul-81						
26-Aug-81						
29-Sep-81						
15-Oct-81						
25-Mar-82						
22-Oct-82						
28-Jan-83						
26-Apr-83						
28-Jul-83						
31-Oct-83						
31-Jan-84	186.60		186.47		DRY	
24-Apr-84	187.24		187.38		188.70	
17-Jul-84	186.97		187.08		188.40	
15-Oct-84	186.71		186.71		DRY	
25-Feb-85	189.94		187.11		DRY	
10-Apr-85	187.10		187.20		DRY	
17-Jul-85			187.36		DRY	
29-Oct-85	186.55		186.17		DRY	
06-May-86	187.99		185.37			
05-Aug-86	186.86		186.70			
21-Oct-86	186.84		186.63		186.63	

THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH

Department of Engineering
71 Main Street West, Hamilton, Ont. L8N 3T4 (416) 526-4170

November 12, 1986

Refer to File No. E309-09 G
Attention of
Your File No

Mr. R. Palombella, P. Eng.
Operations Engineer
Department of Engineering

Dear Sir:

I have had the opportunity to read the report "1985 Annual Operational Monitoring Report Glanbrook Land Fill Site" for the Regional Municipality of Hamilton-Wentworth by Gartner Lee and Associates Ltd."

My attention focused on a paragraph in the covering letter and references similar in content in certain parts of the report. Specifically you state that, "However, there is a concern regarding techniques and protocols that are being used in the acquisition of the data .... etc."

I have examined the protocols which was referred to and herewith are my comments:

Page 15 and 16, Section 3.0 Discussion

The last paragraph on this page states, "Ground Water quality data are generally more variable than would be expected from monitors in fine - textured soils." The discussion goes on to say that occasional data are clearly questionable etc.

I have examined our laboratory technician raw data and find that the variations referred to be real and are inherent in each sample. For example on appendix "Ground Water Use Its Data." Wells 2, sheet No. 1, if one examines the parameters which were measured in each sample on a specific date, one will find related parameters are either consistently high or low in concentration. For example conductivity in all samples are in the range of 2000 to 3100 and at the same time the chloride ion concentration ranges from 140 to 460 mg/l. However the sample dated October 29, 1985 has a conductivity of 60 micro mhos and a chloride concentration of 5.0 mg/l. Since chloride ion concentration and conductivity are directly related, it is obvious that the sample collected on October 29, 1985 is vastly different than all of the samples on sheet number 1. Other parameters in this particular sample are also extraordinarily low in concentration. Exactly the same variation occurs on numerous other sheets.

It appears that the normal concentrations found in mun. boreholes have become highly diluted with water in which a number parameters are of low concentration, such as rainwater.

Page 18, Section 4.0, Monitoring Program

In the first paragraph, the need to continue the monitoring is discussed, and it is stated that, "In this regard it would appear that a better data base is required for characterization of the leachate so that the most appropriate parameters can be used for correlation with monitoring stations".

The data which we have provided is precisely the parameters which we were requested to measure and in my opinion they would certainly characterize leachate from a land fill site. In fact, we were not requested to measure ammonia concentrations but felt that as one of the compounds of nitrogen, it was a necessary parameter to measure. So I am not sure what is meant by the comments in this section. They certainly are not appropriate.

With respect to the sampling program, I have had discussions with Mr. G. J. Dykman who has been doing the sampling exactly as he was shown. During my discussion with him, he made several important statements which I ask him to commit to a memo to me. That memo is attached.

I would like to state that after having gone through a "fine examination" with respect to the comments in the report. The analysis of the samples reflects accurately the correct value of the parameters in each sample. Furthermore, there is a very small variation in the concentrations between samples.

Since the sampling protocol has been done exactly as prescribed, one should conclude that the borehole has not been reflecting the true movement of the leachates. Therefore, one should examine the possibility that the boreholes are either not at the proper location, and/or at the proper depth.

Yours truly,

R. V. Forde, Director
Material Laboratories

RVF/kw/AWF100
Enclosure

cc: Mr. R. Patrick, P. Eng., Director
Mr. J.R.G. Leach, Commissioner

October 10, 1986

Memo to: V. Forde, Director of Laboratories

From: G.J. Dykman, Field Supervisor Solid Waste

Regional Landfill Site- Glanbrook
Ground Water Monitoring

Background:
The 1985 Operational Monitoring Report for the Regional Landfill Site, prepared by Gartner-Lee Associates Limited, refers to a review of sampling protocols and reporting.

Analysis:

The sampling protocol has been carried out by myself since March 1982, using the methods suggested by Gartner-Lee personnel. These include the following:

1) 1 or 2 days prior to the ground water sampling, the monitoring wells are purged by removing a sufficient quantity of water, so that a fresh influx of ground water can be obtained.

2) On the sampling day, the ¼" plastic hose used with the systaltic pump, is rinsed out with distilled water before being inserted into a monitoring well to obtain a ground water sample. An additional 1 to 2 litres of water are purged before collecting the sample.

3) Ground water levels are observed and recorded before any samples are taken.

4) The pump used is of the same make and type of that used by Gartner-Lee.

Filtration of any samples has never been suggested by either Gartner-Lee, or by the Regional Laboratories and samples taken are delivered to the Laboratories within one hour after sampling completion.

With respect to the samples from the leachate manholes, I wish to point out that there is no discernable flow through the leachate sewers, so that samples taken may be from the initial flow from the landfill cells. The exeption may be when the leachate sewer was connected to a new cell(cell 1 to cell 3), and the mounded leachate from cell 1 was levelled over both cells.

GD/

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